TOSHIBA 4 CHANNEL AMPLIFIER

SERVICE DATA

MODEL SB-404

FILE NO. 170-002

SPECIFICATIONS

Main Amplifier

Output:
IHF Music Power 30W x 2 (8Ω) BTL
(Distortion 0.8%) 17W x 4 (8Ω)
R.M.S. 26W x 2 (8Ω) BTL
(Distortion 0.4%) 15W x 4 (8Ω)

Distortion Factor:
Total Harmonic Distortion Factor
At rating output (8Ω) 0.4%
At 2W output (8Ω) 0.1%
IM Distortion Factor
At rating output (8Ω) 0.8%
At 2W output (8Ω) 0.2%

Frequency Response: 10 Hz - 55 kHz +0, -3 dB

Input Sensitivity and Impedance: MAIN IN 0.5V (37 kΩ)

Residual Noise: 0.5 mV (8Ω)

Damping Factor: 20 (8Ω)

Speaker Impedance: 4 - 16Ω (BTL 8 - 16Ω)

Pre-amplifier

Input Sensitivity and Impedance:

PHONO 1 MAG	3 mV	(47 kΩ)
CC	30 mV	(70 kΩ)
PHONO 2	3 mV	(47 kΩ)
TUNER	150 mV	(47 kΩ)
AUX-1 (4CH)	150 mV	(47 kΩ)
AUX-2 (4CH)	150 mV	(47 kΩ)
4CH TAPE	500 mV	(47 kΩ)

Recording Output:

TAPE REC	150 mV
DIN	30 mV
PRE OUT	0.5V (MAX 4.2V)

Frequency Response: 5 Hz - 100 kHz +0, -3 dB

Total Harmonic Distortion Factor: At rating output 0.04%

Maximum Input Voltage:

PHONO MAG	100 mV	(1 kHz)
CC	1.2V	(1 kHz)

Tone Control: BASS (100 Hz) +10 dB, -10 dB
TREBLE (10 kHz) +10 dB, -10 dB

Equalizer: RIAA Standard
+0.5 dB, -0.5 dB (Curve)

Signal-To-Noise Ratio:

PHONO MAG	(3 mV)	65 dB
CC	(30 mV)	70 dB
AUX	(150 mV)	80 dB

Power Source Voltage: AC 100/120/220/240V 50/60 Hz

Power Consumption: 70W (At no signal 16W)

Transistors:
5 ICs
26 Transistors
10 Diodes

Dimensions:

W	400 (mm)	(15¾")
D	280	(11")
H	150	(4½")

Weight: 7.5 kg (3⅜ lbs)

TOKYO SHIBAURA ELECTRIC CO., LTD.

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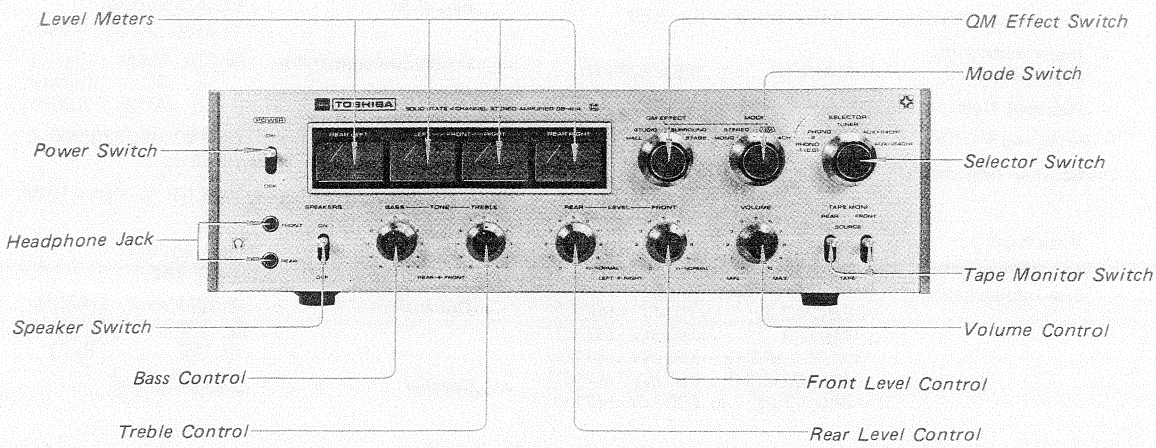
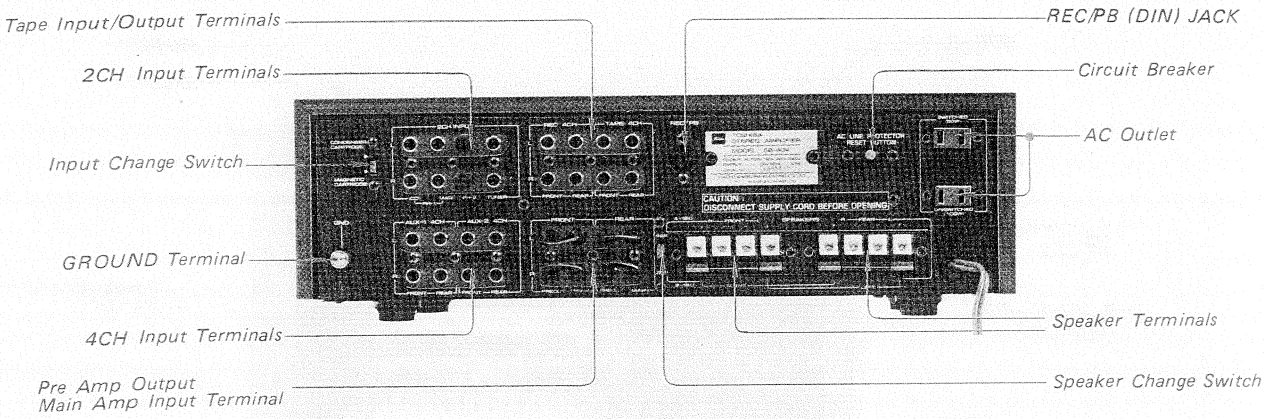
1. OPERATING CONTROLS

1-1. FRONT VIEW

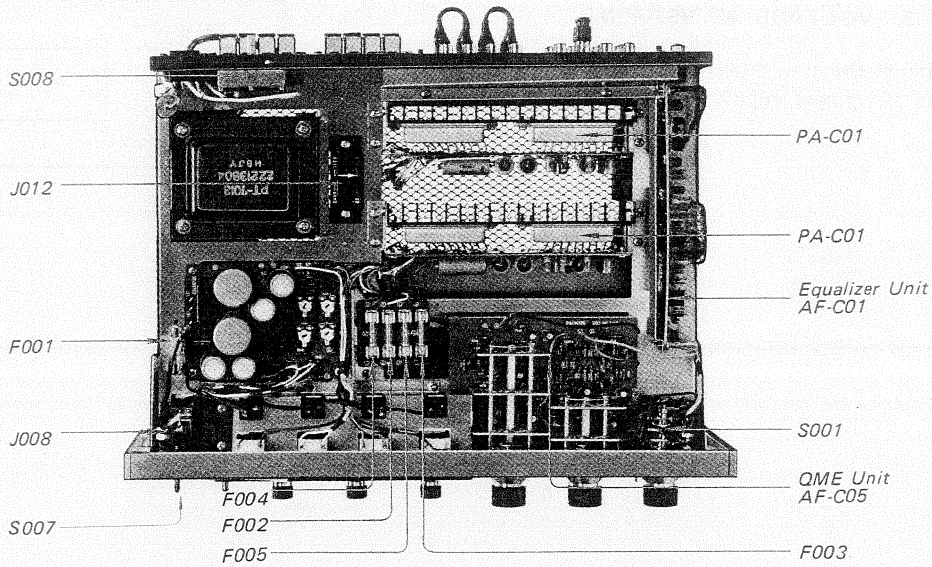


1-2. REAR VIEW

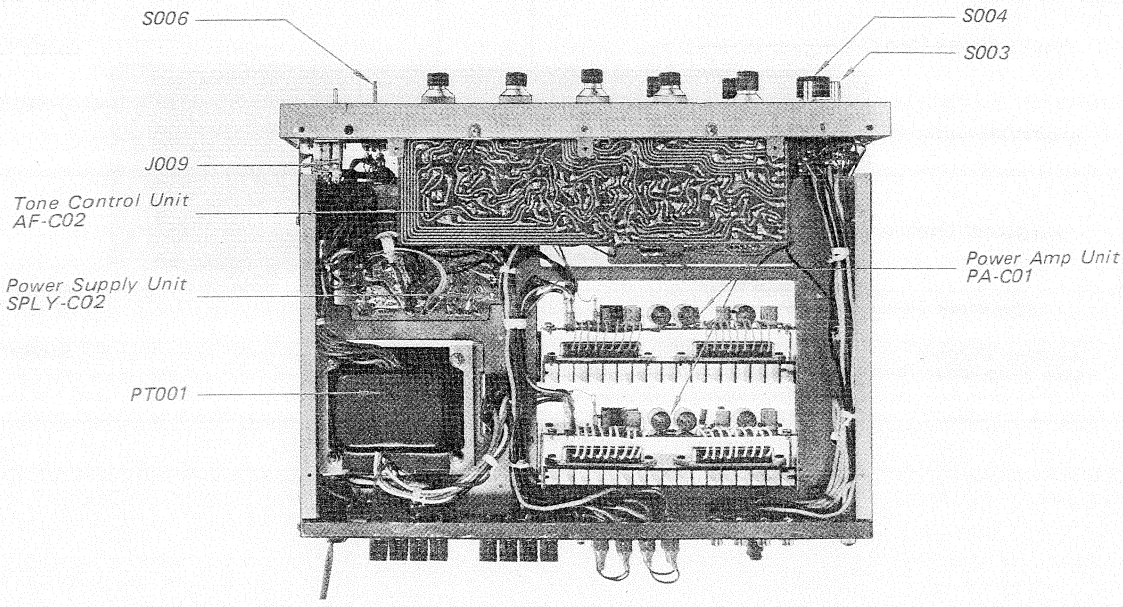


2. PARTS LOCATION

2-1. CHASSIS TOP VIEW

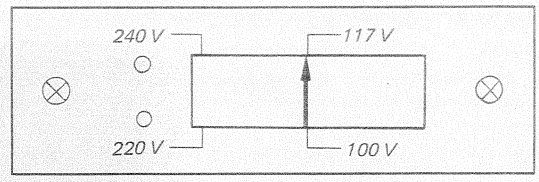


2-2. CHASSIS BOTTOM VIEW

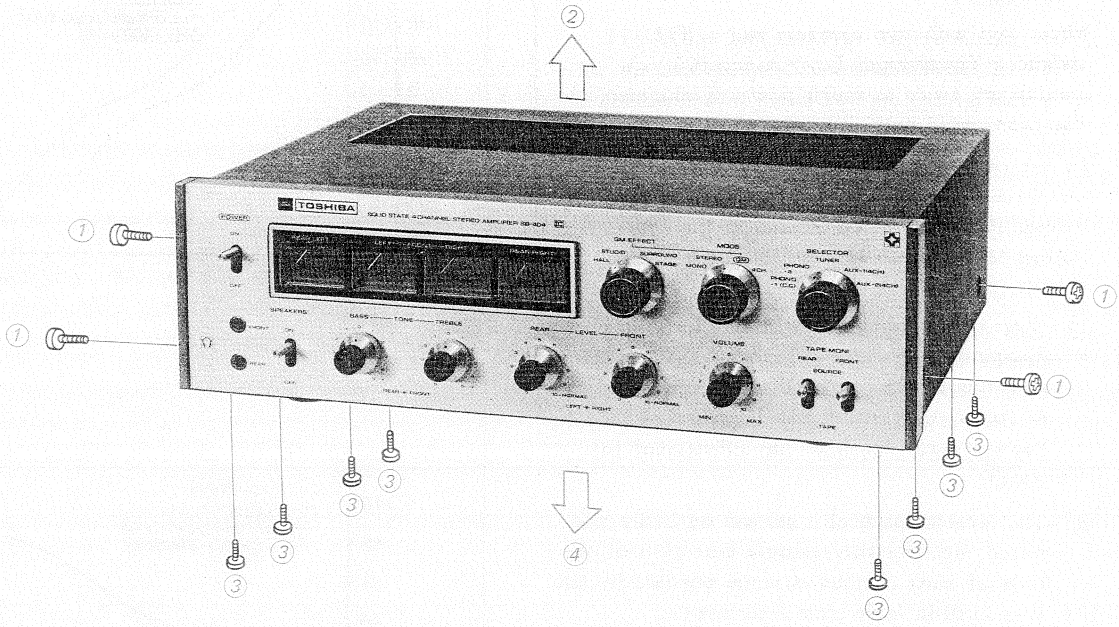


2-3. VOLTAGE ADJUSTMENT

Insert the pin, adjusting the arrow in the direction of the power supply voltage applied.



3. DISASSEMBLY



CABINET REMOVAL

1. Remove the four screws ((1)).
2. Pull out the Cabinet ((2)).

BACK COVER REMOVAL

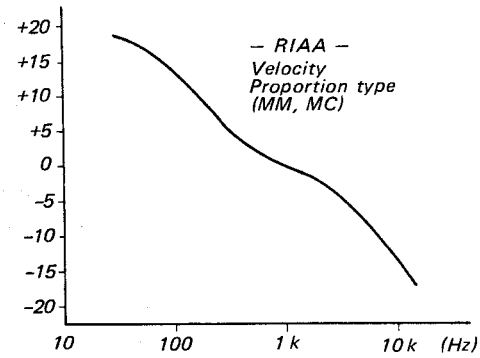
1. Remove the eight screws ((3)).
2. Pull out the Back Cover ((4)).

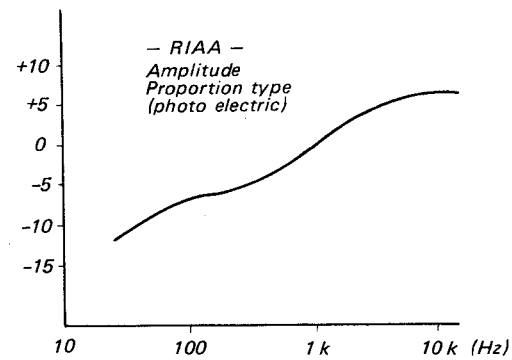
4. TECHNICAL POINTS

1. The all stage direct coupling OCL (Output Condenser Less) type IC amplifiers (output music power 68W) are installed in all the four main amplifiers to increase their performance and reliability.
2. When used with two speakers and a BTL (Balanced Transformer Less) connection, approximately twice as much power is obtained, than when used with only one speaker.
3. All the two channel program sources (record, open reel, cassette, cartridge tape, FM broadcasting, etc.) can be reproduced in the four channel fashion with the built-in QME (QM Effect) unit.
4. This stereo amplifier has a built-in special condenser-cartridge (model number C-401S) amplifier and consequently can be directly connected to the player, and further can be switched to the magnetic cartridge with the aid of the switch.
5. The level of each channel can be easily adjusted, because the accurate detection of the level of each channel is made possible by the four built-in large scale level meters.
6. The low-noise transistors, which are produced on the basis of the PCT manufacturing method developed by the Toshiba, are used for all transistors in this amplifier.
7. The reproduction of all the channel program sources is possible with this unit because two systems of input terminals for four channels are provided.
8. The four channel tape deck can be also used with this amplifier.
9. Two channel headphone may be used as well as the four channel type, (model number HR40) utilizing both the front and rear headphone jacks provided.

CONDENSER-CARTRIDGE AMPLIFIER

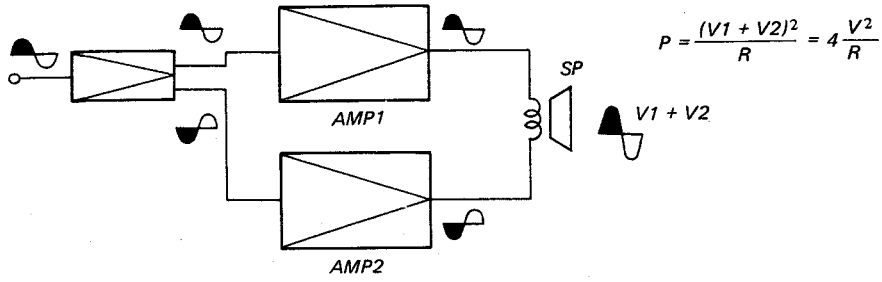
There are two types of cartridge, the velocity proportional type (MM, MC, etc.) and the amplitude proportional type (photoelectric cartridge, etc.). The condenser-cartridge belongs to the latter type and a special correction curve different from the conventional one is necessary. The power for the ICs in the cartridge is supplied through the ground of the input terminal R channel. This amplifier can be directly connected with the condenser-cartridge (This is not the case for the photoelectric cartridge).





BTL CIRCUIT

When the four channel amplifier is used for reproduction with two speakers, this circuit is used in order to operate the four amplifiers effectively. The output voltage of two factors of magnitude can be supplied between the output terminals of each amplifier when the one speaker is operated in phase and the other out of phase with the use of the phase reverse circuit.
Although the output power is theoretically of the four factors of magnitude from the relation, $(2V)^2/R = 4V^2/R$, that is in practice reduced to about two factors of magnitude due to losses such as the regulation of the transformer, the emitter resistance, etc.



BTL CIRCUIT

QM DECODER

The QM Effect is provided with a rotary switch.

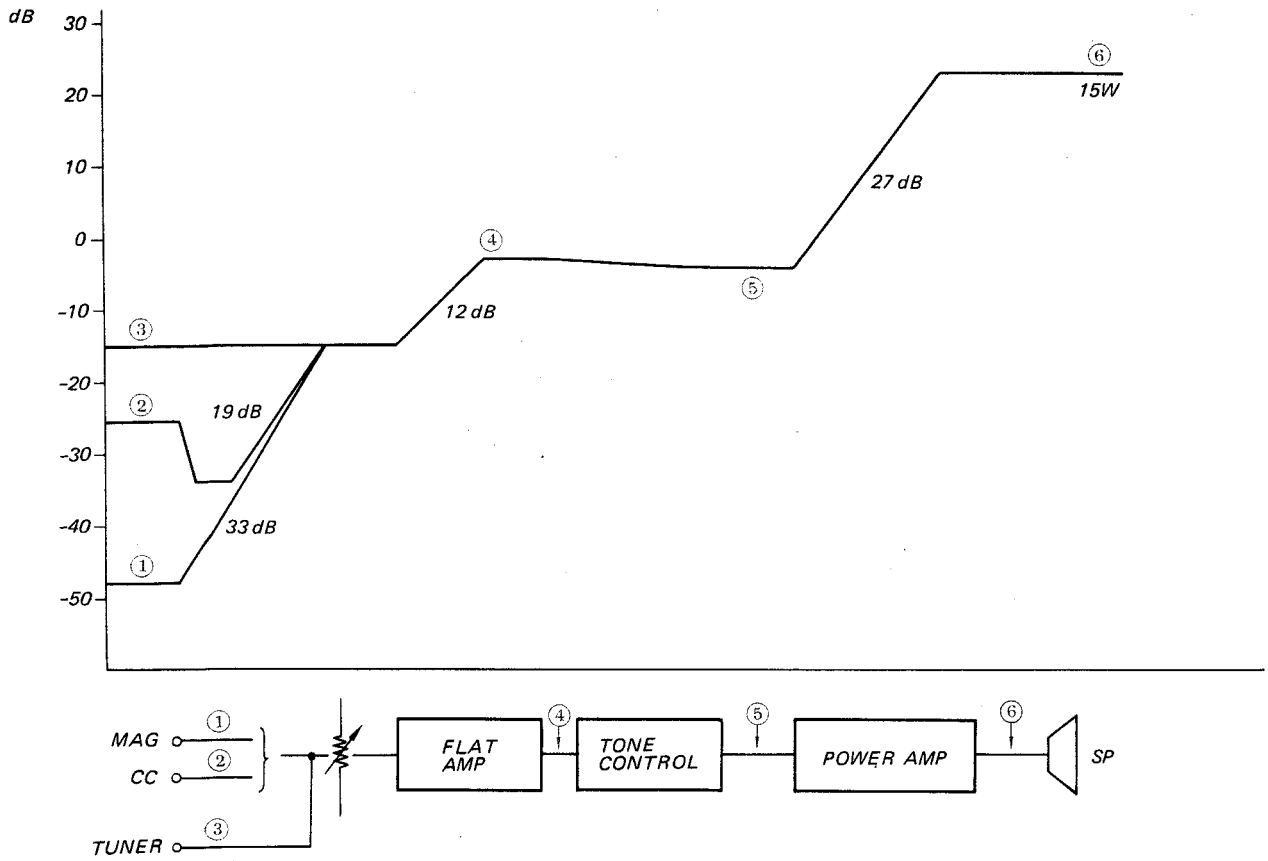
5. SERVICE POINTS

The Cabinet exploded view is shown later.

ADJUSTING METHOD OF LEVEL METER SENSITIVITY

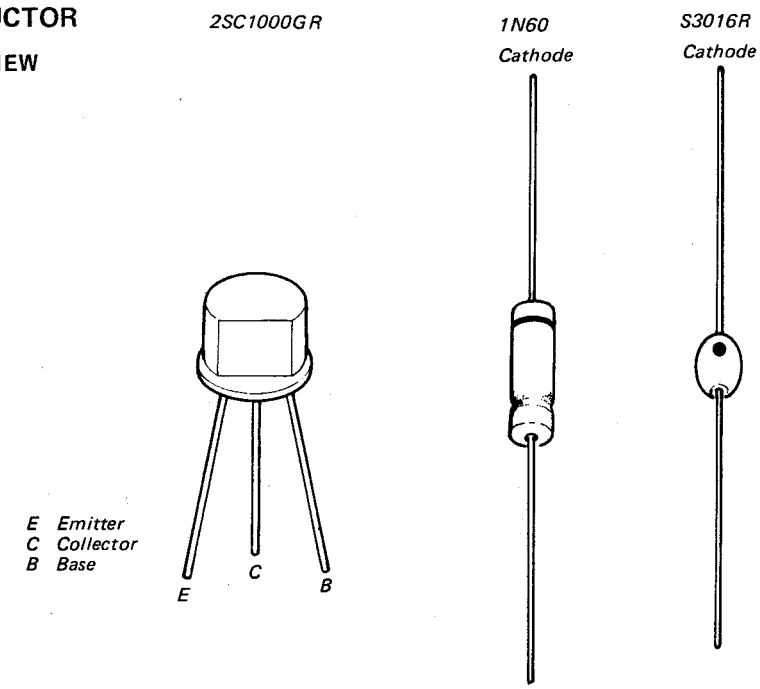
No.	Connection/Adjustment	Remarks
1.	Connect load resistance (8Ω, 20W) to speaker terminal (each channel).	
2.	Connect voltmeter in parallel to load resistance.	
3.	Set speaker switch to 4SP.	
4.	Connect frequency oscillator to AUX-1 (4CH) of input terminal.	Keep frequency to 1 kHz.
5.	Set selector switch to AUX-1 (4CH) and mode switch to 4CH.	Turn volume and level controls fully clockwise and set bass and treble controls to mid-position.
6.	Put power supply switch on.	
7.	Increase input power until 15 dB is indicated on the voltmeter and then adjust VR01 (VR02, VR03, VR04) until 0 dB is indicated on the voltmeter etc. (VR01, VR02, VR03, VR04) are semi-fixed resistor on SPLY-C02 circuit board).	

6. LEVEL DIAGRAM



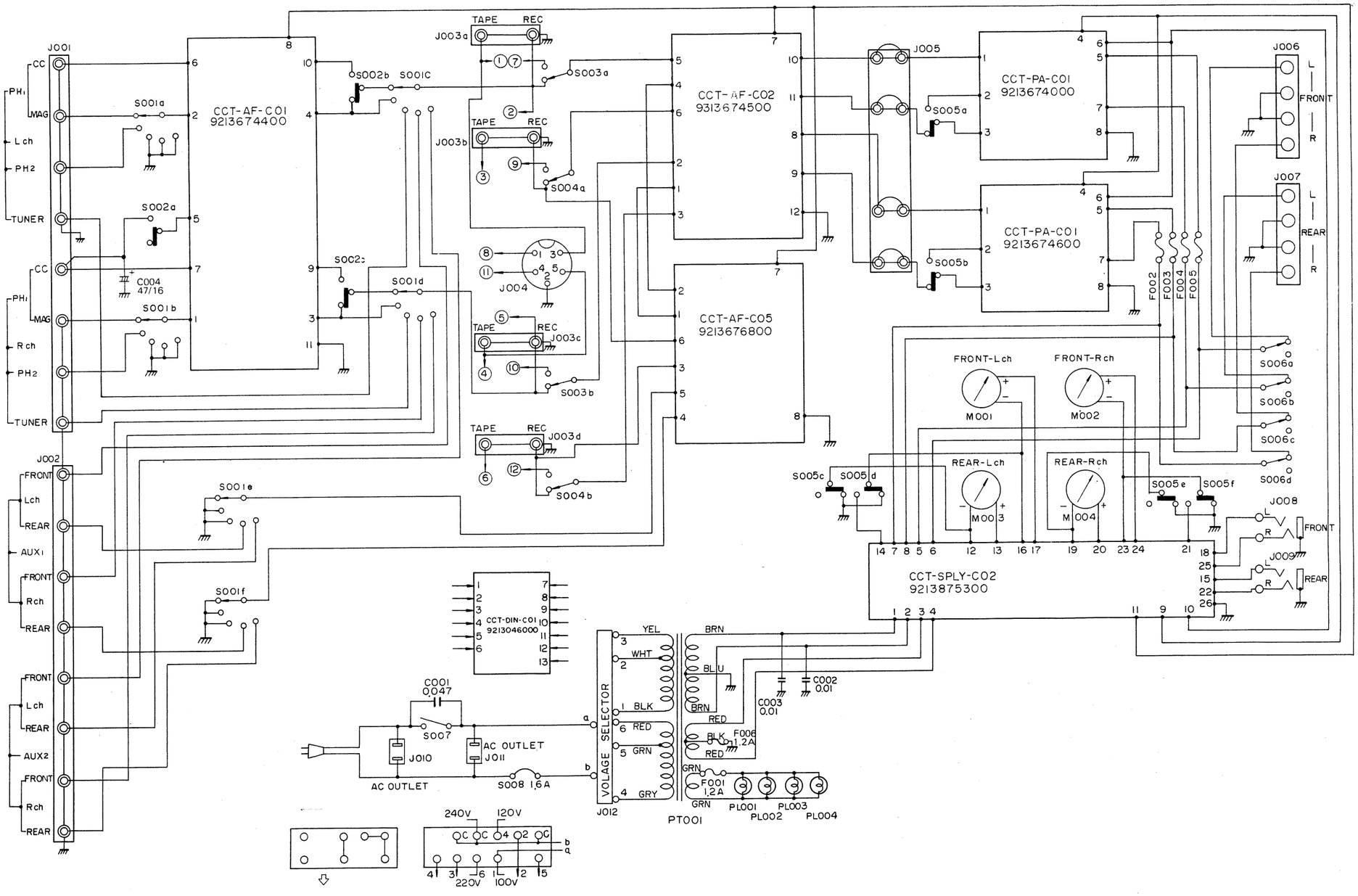
7. SEMICONDUCTOR

TERMINAL VIEW



8. SCHEMATIC DIAGRAMS

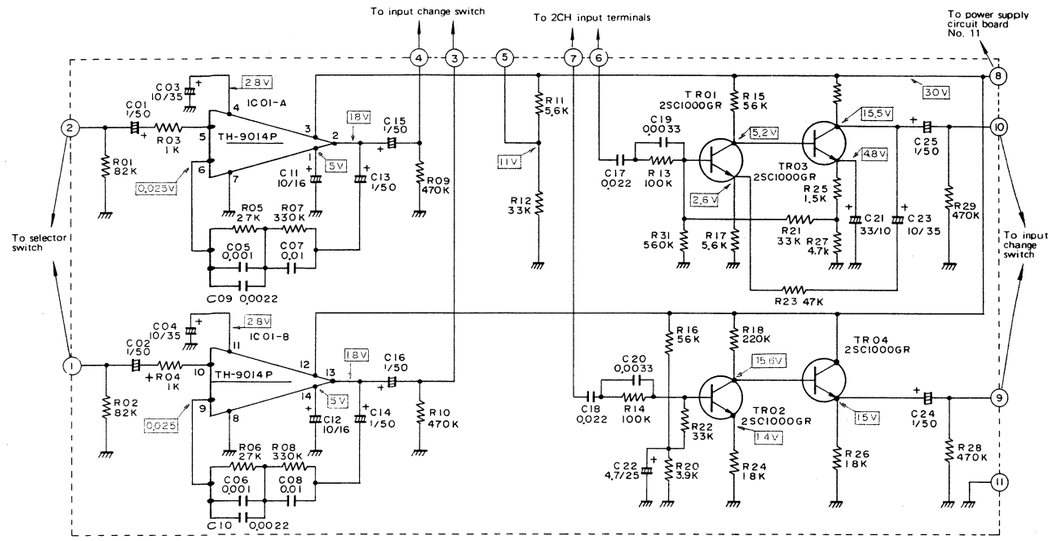
8-1. GENERAL



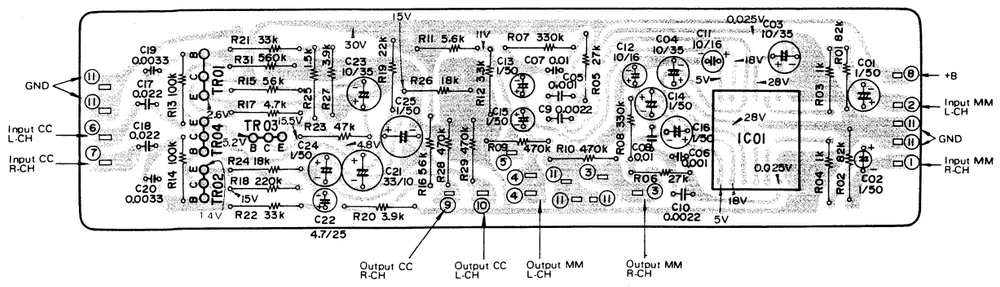
schematic Diagram of the Voltage Selector

8-2. EQ CIRCUIT BOARD (AF-C01)

Schematic Diagram

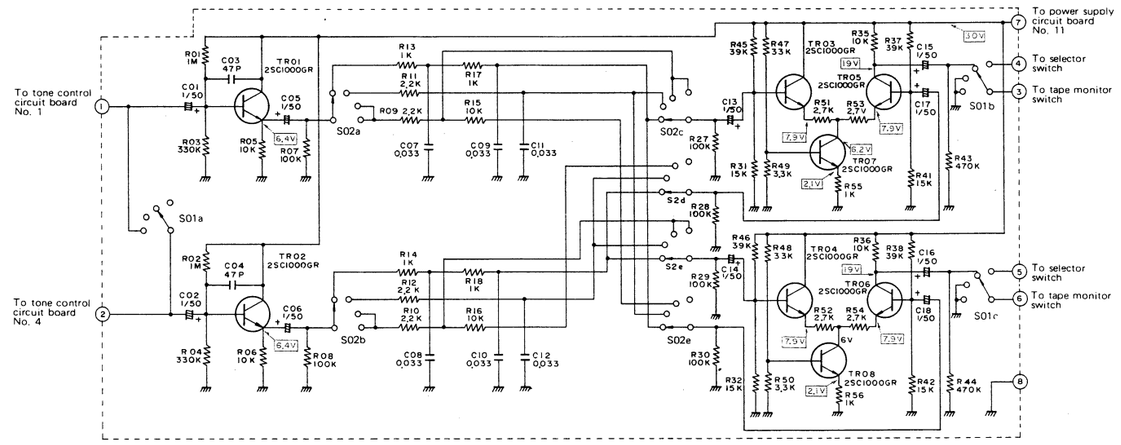


Bottom View

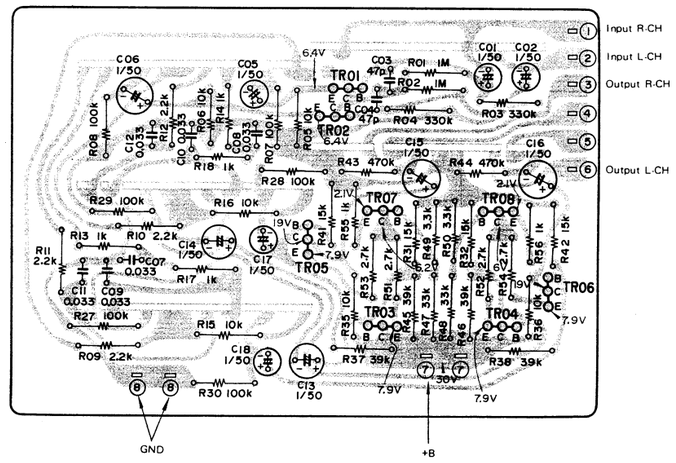


8-3. QME CIRCUIT BOARD (AF-C05)

Schematic Diagram

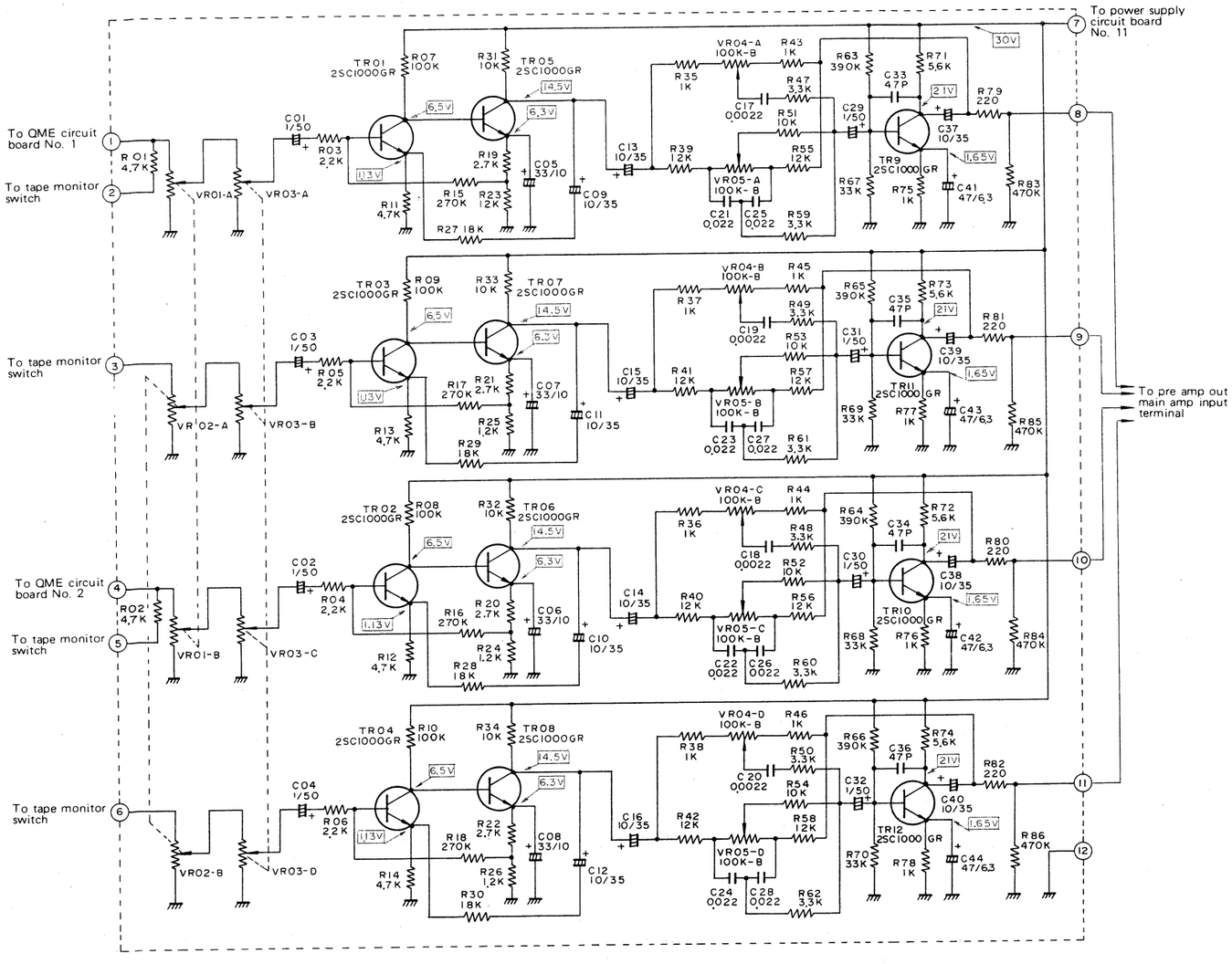


Bottom View

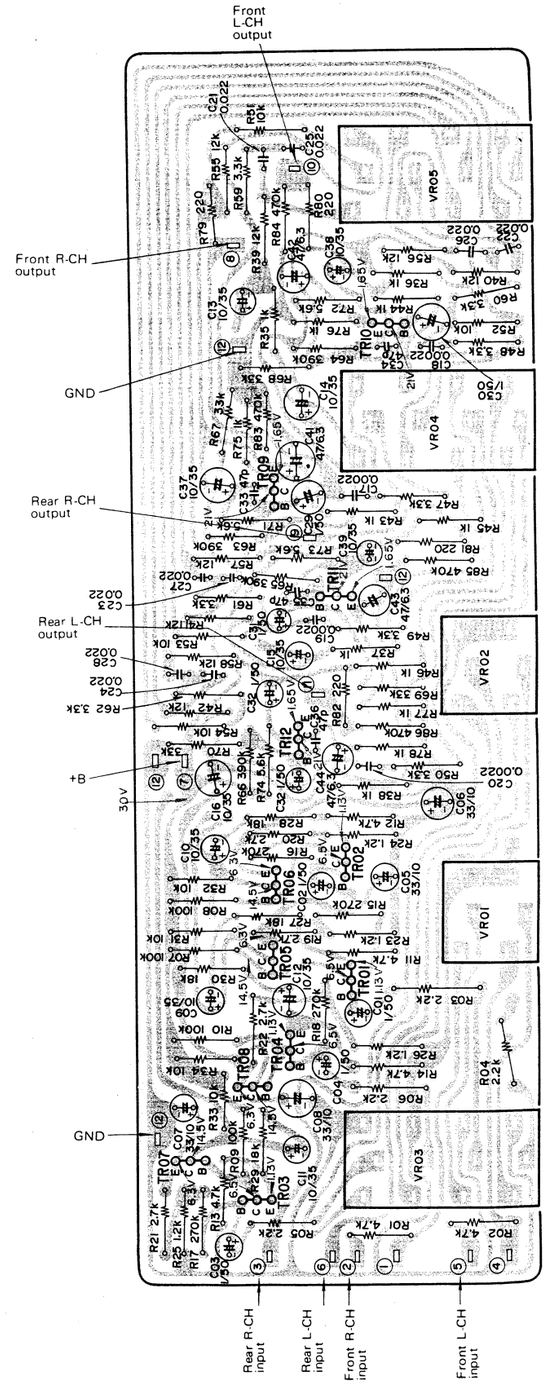


8-4. TONE CONTROL CIRCUIT BOARD (AF-C02)

Schematic Diagram

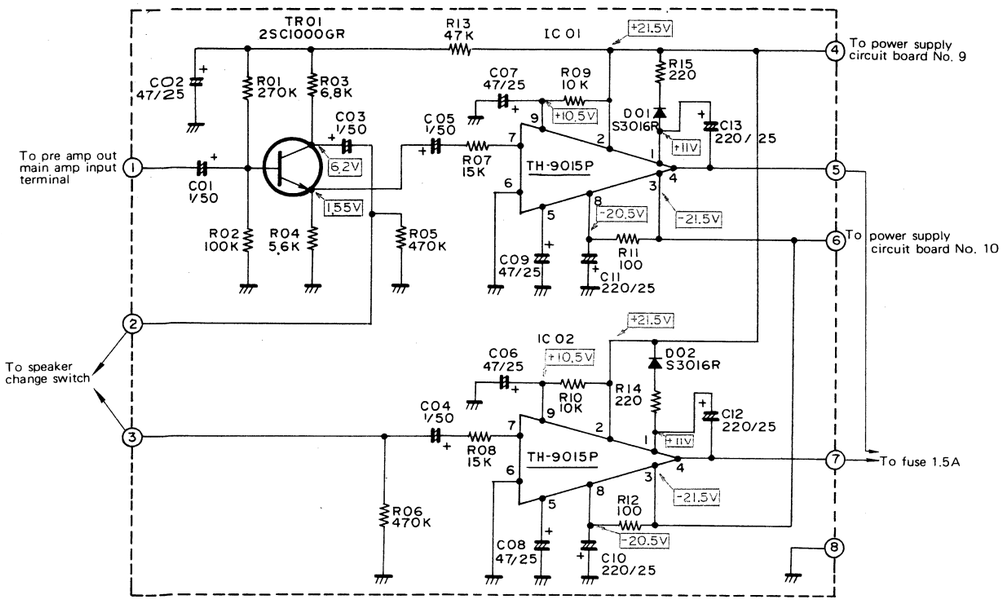


Bottom View

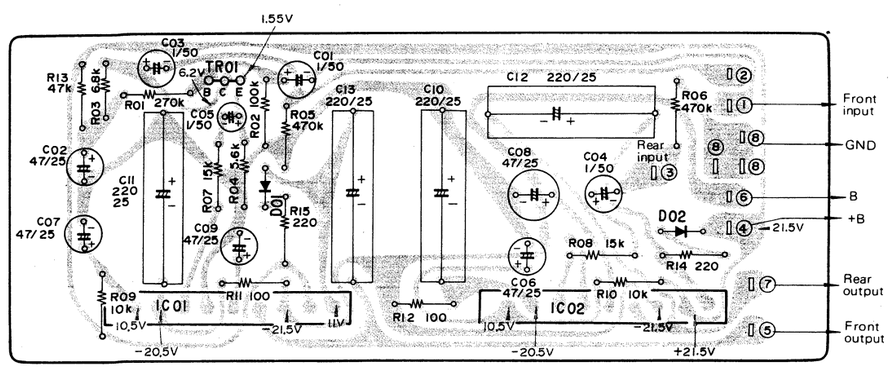


8-5. POWER AMP CIRCUIT BOARD (PA-C01)

Schematic Diagram

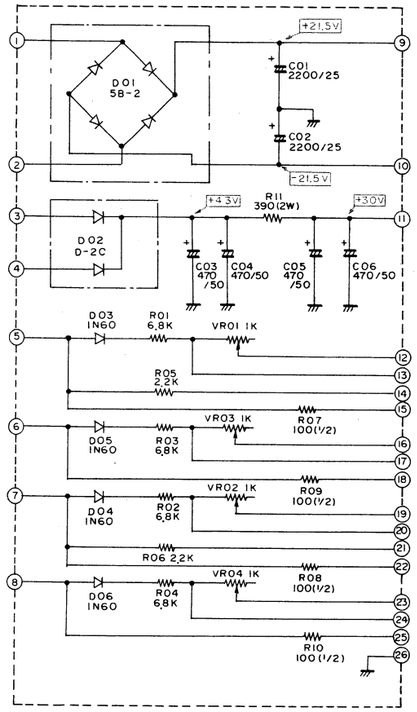


Bottom View

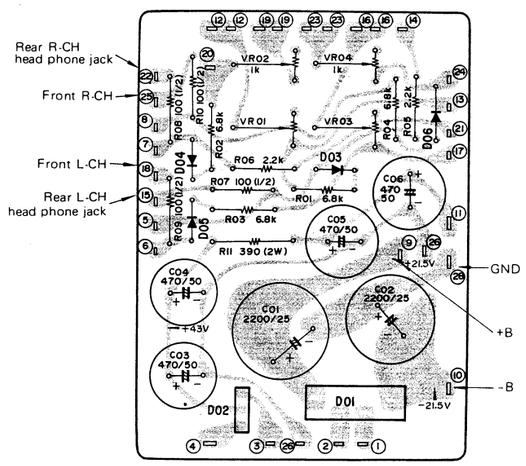


8-6. POWER SUPPLY CIRCUIT BOARD (SPLY-C02)

Schematic Diagram

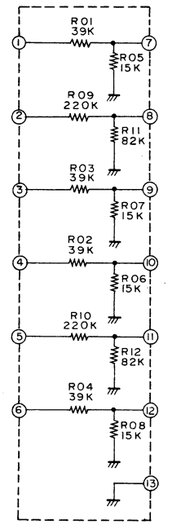


Bottom View

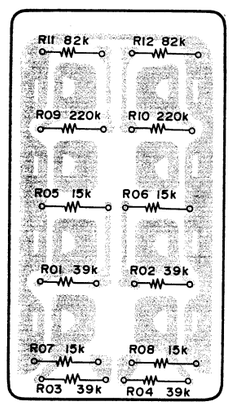


8-7. DIN CIRCUIT BOARD (DIN-C01)

Schematic Diagram

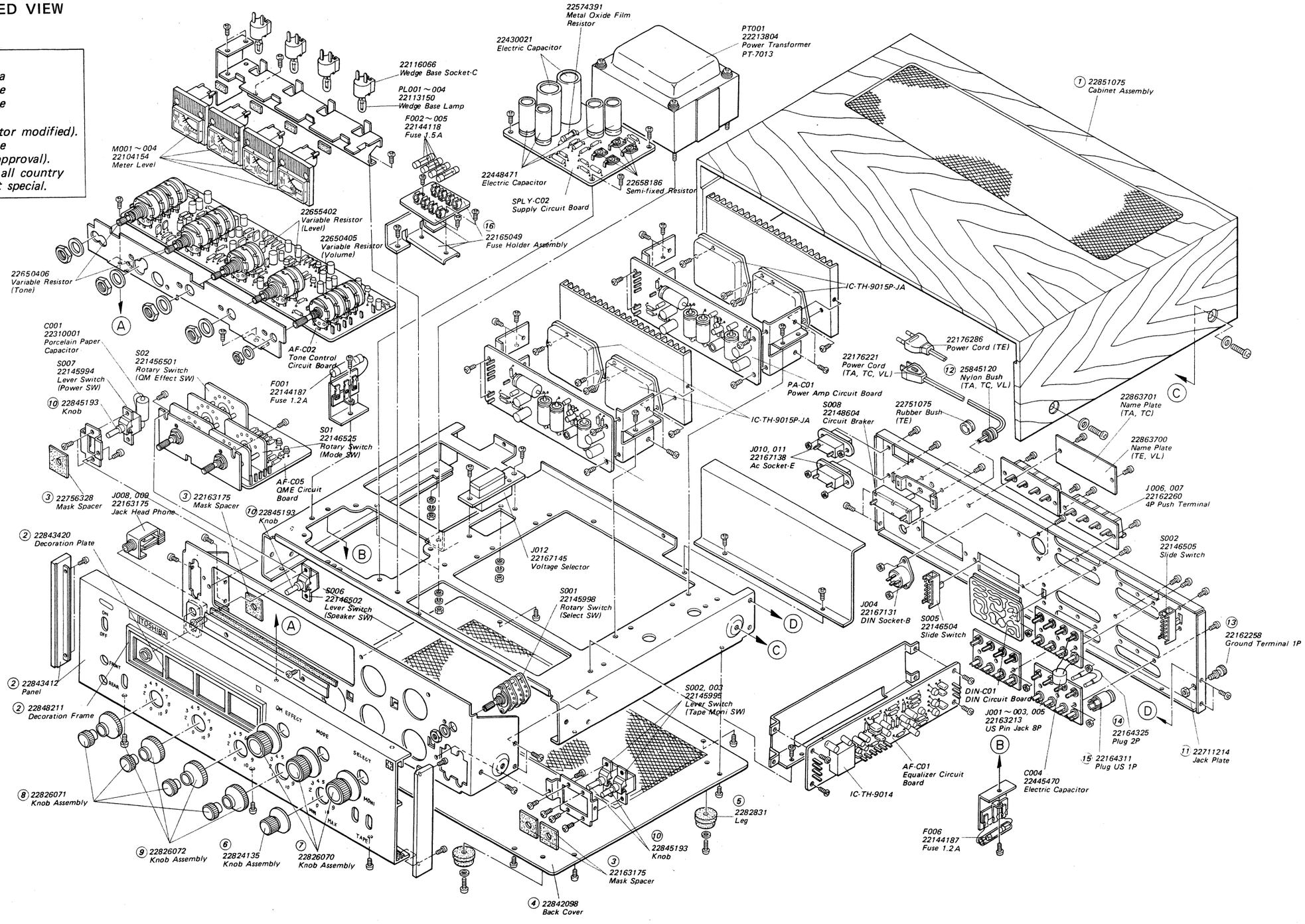


Bottom View

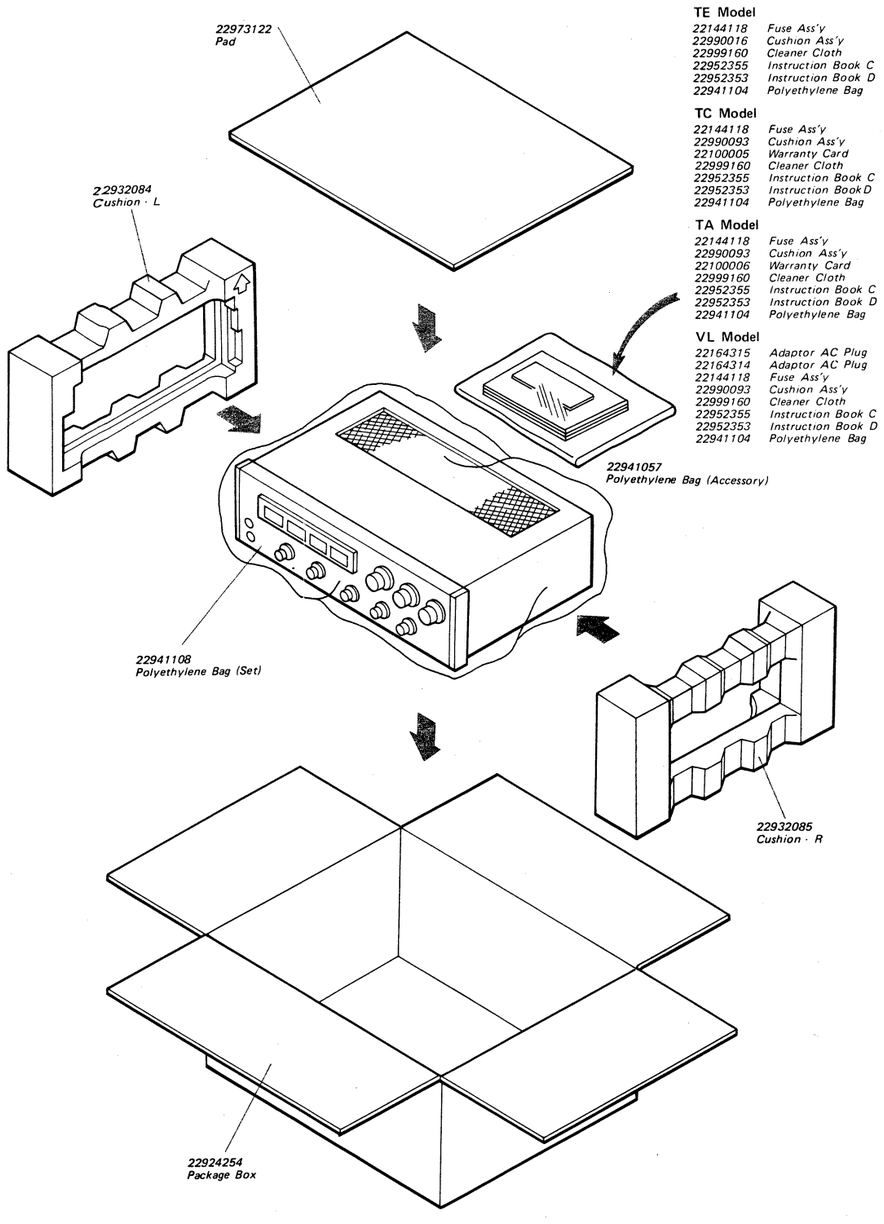


9. EXPLODED VIEW

TA: For U.S.A.
TC: For Canada
TE: For Europe
DTE: For Europe (DIN type connector modified).
DSE: For Europe (SEMKO approval).
VL: For other all country except special.


22574391 Metal Oxide Film Resistor
22430021 Electric Capacitor
PT001 22213804 Power Transformer PT-7013
22116066 Wedge Base Socket-C
PL001 ~ 004 22113150 Wedge Base Lamp
F002 ~ 005 22144118 Fuse 1.5A
M001 ~ 004 22104154 Meter Level
22448471 Electric Capacitor
22658186 Semi-fixed Resistor
SPLY-C02 Supply Circuit Board
22655402 Variable Resistor (Level)
22650405 Variable Resistor (Volume)
22650406 Variable Resistor (Tone)
16 22165049 Fuse Holder Assembly
1 22851075 Cabinet Assembly
IC-TH-9015P-JA
C001 22310001 Porcelain Paper Capacitor
S02 221456501 Rotary Switch (QM Effect SW)
S007 22145994 Lever Switch (Power SW)
AF-C02 Tone Control Circuit Board
F001 22144187 Fuse 1.2A
S01 22146525 Rotary Switch (Mode SW)
AF-C05 QME Circuit Board
10 22845193 Knob
3 22756328 Mask Spacer
J008, 009 22163175 Jack Head Phone
3 22163175 Mask Spacer
10 22845193 Knob
2 22843420 Decoration Plate
S006 22146502 Lever Switch (Speaker SW)
J012 22167145 Voltage Selector
S001 22145998 Rotary Switch (Select SW)
2 22843412 Panel
2 22848211 Decoration Frame
8 22826071 Knob Assembly
9 22826072 Knob Assembly
6 22824135 Knob Assembly
7 22826070 Knob Assembly
S002, 003 22145995 Lever Switch (Tape Moni SW)
5 2282831 Leg
10 22845193 Knob
3 22163175 Mask Spacer
4 22842098 Back Cover
PA-C01 Power Amp Circuit Board
S008 22148604 Circuit Braker
22751075 Rubber Bush (TE)
IC-TH-9015P-JA
J010, 011 22167138 Ac Socket-E
22176286 Power Cord (TE)
22176221 Power Cord (TA, TC, VL)
12 25845120 Nylon Bush (TA, TC, VL)
22863701 Name Plate (TA, TC)
22863700 Name Plate (TE, VL)
J006, 007 22162260 4P Push Terminal
S002 22146505 Slide Switch
J004 22167131 DIN Socket-8
S005 22146504 Slide Switch
13 22162258 Ground Terminal 1P
DIN-C01 DIN Circuit Board
J001 ~ 003, 005 22163213 US Pin Jack 8P
14 22164325 Plug 2P
15 22164311 Plug US 1P
11 22711214 Jack Plate
AF-C01 Equalizer Circuit Board
IC-TH-9014
C004 22445470 Electric Capacitor
F006 22144187 Fuse 1.2A

10. PACKING



TE Model

22144118	Fuse Ass'y
22990016	Cushion Ass'y
22999160	Cleaner Cloth
22952355	Instruction Book C
22952353	Instruction Book D
22941104	Polyethylene Bag

TC Model

22144118	Fuse Ass'y
22990093	Cushion Ass'y
22100005	Warranty Card
22999160	Cleaner Cloth
22952355	Instruction Book C
22952353	Instruction Book D
22941104	Polyethylene Bag

TA Model

22144118	Fuse Ass'y
22990093	Cushion Ass'y
22100006	Warranty Card
22999160	Cleaner Cloth
22952355	Instruction Book C
22952353	Instruction Book D
22941104	Polyethylene Bag

VL Model

22164315	Adaptor AC Plug
22164314	Adaptor AC Plug
22144118	Fuse Ass'y
22990093	Cushion Ass'y
22999160	Cleaner Cloth
22952355	Instruction Book C
22952353	Instruction Book D
22941104	Polyethylene Bag

PARTS LIST

Key No.	Part No.	Description
MISCELLANEOUS		
M001—004	22104154	Meter, Level
PLS001—004	22116066	Wedge Base Socket
F001, 006	22144187	Fuse (1.2A)
F002—005	22144118	Fuse (1.5A)
PL001—004	22113150	Wedge Base Lamp (6.3V 0.25A)
S001	22145998	Rotary Switch (Select SW)
S002, 003	22145995	Lever Switch (Tape Moni SW)
S004	22146505	Slide Switch
S005	22146504	Slide Switch
S006	22146502	Lever Switch (Speaker)
S007	22145994	Lever Switch (Power)
S008	22148604	Circuit Breaker
J001—003, 005	22163213	US Pin Jack 8P
J004	22167131	DIN Socket B
J006, 007	22162260	4P Push Terminal
J008, 009	22163175	Headphone Jack
J010, 011	22167138	AC Socket E
J012	22167145	Voltage Selector
13	22162258	Ground Terminal
14	22164325	Plug 2P
15	22164311	Plug US 1P
16	22165049	Fuse Holder Assembly
	22184101	Wiring Cord Holder
PT001	22213804	Power Transformer
C001	22310001	0.047μF Ceramic Capacitor
C002, 003	22340030	0.01μF Ceramic Capacitor
C004	22445470	47μF/16V Electrolytic Capacitor
CABINET PARTS		
1	22819103	Cabinet Assembly
2	22823076	Panel Assembly
3	22756328	Mask Spacer
4	22842098	Back Cover
5	22828031	Leg
6	22824135	Knob (Medium)
7	22826070	Knob (Large)
8	22826071	Knob (External)
9	22826072	Knob (Internal)
10	22845193	Knob
11	22711214	Jack Plate
12	22845120	Nylon Bush
POWER SUPPLY CIRCUIT BOARD		
D01		Selenium Rectifier 5B-2
D02		Selenium Rectifier 1D-2C1
D03, 04, 05, 06		Diode 1N60

Schematic Location	Parts No.	Description
C01, 02	22430021	2,200μF/25V Electrolytic Capacitor
C03—06	22448471	470μF/50V Electrolytic Capacitor
R01—04	22544682	6.8 k ohm 1/8W Carbon Resistor
R05, 06	22544222	2.2 k ohm 1/8W Carbon Resistor
R07—10	22563101	100 k ohm 1/2W Composition Resistor
VR01—04	22658186	Semifixed Resistor (1 k ohm)
	22574391	390 ohm 2W Oxide Metal Resistor
POWER AMPLIFIER CIRCUIT BOARD		
TR01		Transistor 2SC1000-GR
D01, 02		Varistor S3016-R
IC01, 02		IC TH9015P-JA
	22748062	Radiator
C01, 03, 04, 05	22448109	1μF/50V Electrolytic Capacitor
C02, 06—09	22446470	47μF/25V Electrolytic Capacitor
C10—13	22456221	220μF/25V Electrolytic Capacitor
R01	22544274	270 k ohm 1/8W Carbon Resistor
R02	22544104	100 k ohm 1/8W Carbon Resistor
R03	22544682	6.8 k ohm 1/8W Carbon Resistor
R04	22544562	5.6 k ohm 1/8W Carbon Resistor
R05, 06		
R05, 06	22544474	470 k ohm 1/8W Carbon Resistor
R07, 08	22544153	15 k ohm 1/8W Carbon Resistor
R09, 10	22544103	10 k ohm 1/8W Carbon Resistor
R11, 12		100 ohm 2W Oxide Metal Resistor
R13	2254473	47 k ohm 1/8W Carbon Resistor
TONE CONTROL CIRCUIT BOARD		
TR01—12		Transistor 2SC1000-GR
VR01, 02	22655402	Volume Control (250 k ohm)
VR03	22650405	Volume Control (250 k ohm)
VR04, 05	22650406	Volume Control (100 k ohm)
C01—04	22448109	1μF/50V Electrolytic Capacitor

Schematic Location	Part No.	Description
C05–08	22443330	33μF/10V Electrolytic Capacitor
C09–16	22447100	10μF/35V Electrolytic Capacitor
C17–20	22373222	0.0022μF/50V Mylar Capacitor
C21–28	22373223	0.022μF/50V Mylar Capacitor
C29–32	22448109	1μF/50V Electrolytic Capacitor
C33–36	22362470	47pF/50V Ceramic Capacitor
C37–40	22447100	10μF/35V Electrolytic Capacitor
C41–44	22442470	47μF/6.3V Electrolytic Capacitor
R01, 02, R11–14	22544472	4.7k ohm 1/8W Carbon Resistor
R03–06	22544222	2.2k ohm 1/8W Carbon Resistor
R07–10	22544104	100k ohm 1/8W Carbon Resistor
R15–18	22544274	270k ohm 1/8W Carbon Resistor
R19–22	22544272	2.7k ohm 1/8W Carbon Resistor
R23–26	22544122	1.2k ohm 1/8W Carbon Resistor
R27–30	22544183	18k ohm 1/8W Carbon Resistor
R31–34	22544103	10k ohm 1/8W Carbon Resistor
R35–38	22544102	1k ohm 1/8W Carbon Resistor
R39–42	22544123	12k ohm 1/8W Carbon Resistor
R43, 44	22544102	1k ohm 1/8W Carbon Resistor
R45, 46	22544123	12k ohm 1/8W Carbon Resistor
R47–50, R59, 60	22544332	3.3k ohm 1/8W Carbon Resistor
R51–54	22544103	10k ohm 1/8W Carbon Resistor
R55–58	22544123	12k ohm 1/8W Carbon Resistor
R61–66	22544394	390k ohm 1/8W Carbon Resistor
R67–70	22544333	33k ohm 1/8W Carbon Resistor
R71–74	22544562	5.6k ohm 1/8W Carbon Resistor
R75–78	22544123	12k ohm 1/8W Carbon Resistor
R79–82	22544221	220 ohm 1/8W Carbon Resistor
R83–86	22544474	470k ohm 1/8W Carbon Resistor

EQUALIZER CIRCUIT BOARD

TR01–04		Transistor 2SC1000-GR
IC01		IC TH9014P
C01, 02	22448109	1μF/50V Electrolytic Capacitor
C03, 04	22447100	10μF/35V Electrolytic Capacitor
C05, 06	22373102	0.001μF/50V Mylar Capacitor
C07, 08	22373103	0.01μF/50V Mylar Capacitor
C09, 10	22373222	0.0022μF/50V Mylar Capacitor
C11, 12	22445100	10μF/16V Electrolytic Capacitor
C13–16	22448109	1μF/50V Electrolytic Capacitor
C17, 18	22373223	0.022μF/50V Mylar Capacitor
C19, 20	22373332	0.0033μF/50V Mylar Capacitor
C21	22443330	33μF/10V Electrolytic Capacitor
C22	22446479	47μF/25V Electrolytic Capacitor
C23	22447100	10μF/35V Electrolytic Capacitor
C24, 25	22448109	1μF/50V Electrolytic Capacitor
R01, 02	22544823	82k ohm 1/8W Carbon Resistor
R03, 04	22544102	1k ohm 1/8W Carbon Resistor
R05, 06	22544273	27k ohm 1/8W Carbon Resistor
R07, 08	22544334	330k ohm 1/8W Carbon Resistor
R09, 10, 28, 29	22544474	470k ohm 1/8W Carbon Resistor
R11	22544562	5.6k ohm 1/8W Carbon Resistor
R12	22544332	3.3k ohm 1/8W Carbon Resistor
R13, 14	22544104	100k ohm 1/8W Carbon Resistor

Schematic Location	Part No.	Description
R15, 16	22544563	56k ohm 1/8W Carbon Resistor
R17	22544472	4.7k ohm 1/8W Carbon Resistor
R18	22544224	220k ohm 1/8W Carbon Resistor
R19	22544223	22k ohm 1/8W Carbon Resistor
R20, 27	22544392	3.9k ohm 1/8W Carbon Resistor
R21, 22	22544333	33k ohm 1/8W Carbon Resistor
R23	22544473	47k ohm 1/8W Carbon Resistor
R24, 26	22544183	18k ohm 1/8W Carbon Resistor
R25	22544152	1.5k ohm 1/8W Carbon Resistor

DIN CIRCUIT UNIT

R01–04	22544393	39k ohm 1/8W Carbon Resistor
R05–08	22544153	15k ohm 1/8W Carbon Resistor
R09, 10	22544224	220k ohm 1/8W Carbon Resistor
R11, 12	22544823	82k ohm 1/8W Carbon Resistor

QME UNIT

TR01–08		Transistor 2SC1000-GR
S01	22146525	Rotary Switch
S02	22146501	Rotary Switch
C01, 02	22448109	1μF/50V Electrolytic Capacitor
C03, 04	22362470	47pF/50V Ceramic Capacitor
C05, 06	22448109	1μF/50V Electrolytic Capacitor
C07–12	22373333	0.033μF/50V Mylar Capacitor
C13, 14	22448109	1μF/50V Electrolytic Capacitor
C15–18	22373333	0.033μF/50V Mylar Capacitor
R01, 02	22544105	1M ohm 1/8W Carbon Resistor
R03, 04	22544334	330k ohm 1/8W Carbon Resistor
R05, 06, 15, 16	22544103	10k ohm 1/8W Carbon Resistor
R07, 08	22544104	100k ohm 1/8W Carbon Resistor
R09–12	22544222	2.2k ohm 1/8W Carbon Resistor
R13, 14, 17, 18	22544102	1k ohm 1/8W Carbon Resistor
R27–30	22544104	100k ohm 1/8W Carbon Resistor
R31, 32, 41, 42	22544153	15k ohm 1/8W Carbon Resistor
R35, 36	22544103	10k ohm 1/8W Carbon Resistor
R37, 38, 45, 46	22544393	39k ohm 1/8W Carbon Resistor
R43, 44	22544474	470k ohm 1/8W Carbon Resistor
R47, 48	22544333	33k ohm 1/8W Carbon Resistor
R49, 50	22544332	3.3k ohm 1/8W Carbon Resistor
R51–54	22544272	2.7k ohm 1/8W Carbon Resistor
R55, 56	22544102	1k ohm 1/8W Carbon Resistor

MEMO

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22955125
Printed in Japan
March 1972